U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Marine Fisheries Service

Lesson 17: Plankton

Overview

This lesson familiarizes students with taxonomic classification as preparation for the series of lessons (17-20) that provides a survey of marine life. The lecture provides basic life history information about plankton. In the activity, students categorize unidentified specimens of plankton according to the classification schemes they learned in the lecture.

Lesson Objectives

Students will:

1. Explain that phytoplankton are major primary producers in the ocean

2. Differentiate between zooplankton and phytoplankton, and between holoplankton and meroplankton

3. Describe and categorize 10 plankton specimens

Lesson Contents

Standards Addressed

National Science Education Standards, Grades 9-12
Unifying concepts and processes
Physical science
Earth and space science

Ocean Literacy Principles
The ocean and life in the ocean shape the features of the Earth

DCPS, High School
Biology
B.6.5. Explain that during the process of photosynthesis, plants release oxygen into the air

Lesson Outline[1]

I. Introduction

Introduce today's lesson with a primer on the Linnaean taxonomic system, which is the way scientists organize and classify life on Earth. It is essential that all the students recall the basic hierarchy of organization before delving into the survey of life in the sea. At the NOSB, students are expected to know some of the basic natural history of marine organisms.

Hand out the Student Handout on natural history. Remind students that scientists use the Linnaean system to classify all organisms on Earth. Species is the most specific group of classification and generally refers to organisms that can reproduce to form fertile offspring. Genus is the next highest group that refers to groups of similar species. Family is a group of similar genera (plural of genus) and so forth up the hierarchy until Kingdom, which is a very broad classification group. Scientists refer to species by the *Genus* (capitalized, italicized), *species* (lower case, italicized) and, in some cases, by sub-species names.

Go through an example with your students. If you have internet access handy, you may want to let the students pick one or two of their favorite marine organisms for you to search online (it is relatively simple to find a complete taxonomic listing for almost any species using Google). An example is provided below if an internet search is not possible or will take up too much time. Write the complete taxonomy on the board.

Finally, instruct your students to do their own search at home or in the library for one of their favorite species (not one that you already did). Tell them to make a sketch of their species on their handout, to write the complete taxonomy and to share an interesting fact about the species (e.g., an interesting behavior it displays or its relevance to humans). Have the students share these at the beginning of the next few classes.

Example: Orange clownfish

Fact: This popular pet and star of *Finding Nemo* is commercially bred in aquaculture.

Kingdom	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Perciformes
Family:	Pomacentridae
Genus:	*Amphiprion*
Species:	*ercula*

[1] Unless otherwise indicated, all websites provided or referenced in this guide were last accessed in November 2010.

II. Lecture Notes

Present the information in the Lesson 17 PowerPoint (File: Lesson 17 – Plankton.ppt). Distribute the Student Handout before you begin for students to take notes on key information.

III. Additional Resources

1. Background information
   http://www.st.nmfs.noaa.gov/plankton/intro/why.html
2. Zooplankton
   http://www.nerrs.noaa.gov/Doc/SiteProfile/ACEBasin/html/biores/zooplank/zptext.htm

Identifying Plankton

Overview

Today's activity is built into the PowerPoint. This activity was created by and used with permission from Lisa Wu, a teacher at the Thomas Jefferson High School for Science and Technology in Virginia, and editor Carol Lange. The activity presents samples of plankton to students and asks them to describe and categorize each specimen according to characteristics they learned in the lecture.

Procedure

1. Distribute two Specimen Drawing Worksheets to each student.

2. Instruct students to take notes and sketches of each sample as demonstrated on the observation slide.

3. Show each specimen for two minutes while students record their observations and hypotheses.

4. Be sure to leave enough time to go through the answer slides because these provide important Bowl information.

Specimen # __________ Circle one from each category: Phytoplankton or Zooplankton Holoplankton or Meroplankton Circle Characteristics: Bodyshape/Tail/flagella/appendages/eyes/gills/other features Describe:	Sketch:

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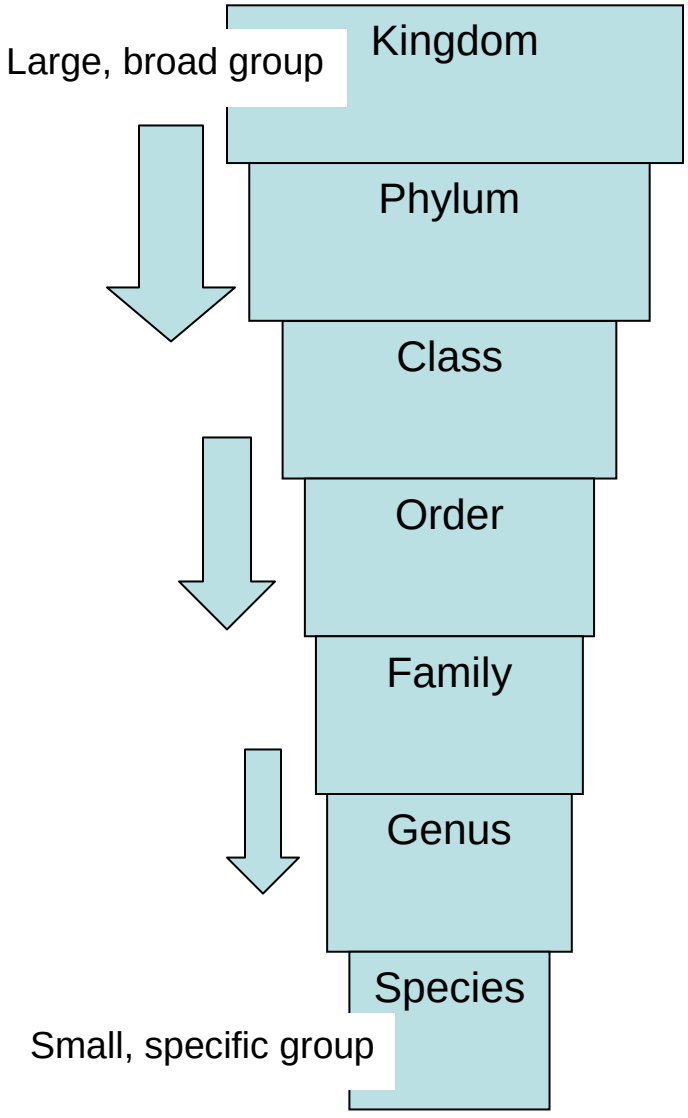
What to Know for the Bowl - Natural History

At the NOSB you need to understand the taxonomic system, which is the method that scientists use to classify organisms. Over the next several weeks, you will learn about the classification of some marine organisms. Hang on to this worksheet to remind yourself of the system. To get started, research the taxonomy of one of your favorite marine organisms.

The Linnaean Taxonomic System



Plankton

1. What is the term used to describe organisms that are planktonic only in their larval stage?
    w. Holoplankton
    x. **Meroplankton**
    y. Femptoplankton
    z. Picoplankton

2. Short answer: What is another term for a primary producer?
    Answer: Autotroph

3. Diatoms are plankton with shells made from:
    w. **Silica**
    x. Oxygen
    y. Nitrogen
    z. Iron

4. This type of plankton can form harmful algal blooms (HAB):
    w. Nekton
    x. **Dinoflagellates**
    y. Megalopae
    z. Fish larvae

5. Which of the following is not a holoplankton?
    w. Krill
    x. Dinoflagellates
    y. Diatoms
    z. **Crab larvae**

6. The following term refers to plankton that are animals and unable to produce their own food:
    w. Holoplankton
    x. Phytoplankton
    y. Nekton
    z. **Zooplankton**

7. Phytoplankton are responsible for about how much of the ocean's primary productivity?
    w. **90%**
    x. 50%
    y. 20%
    z. 10%

8. Short answer: This term refers to meroplankton that become free swimmers with the ability to swim against currents:
   Answer: Nekton

9. Reminder question: The following term refers to a coast that is located on a plate boundary:
   w. Passive coast
   x. Secondary coast
   y. **Active coast**
   z. Delta

10. Team challenge question

    1. What process supplies most of the usable energy in the ocean? (1pt)

    2. What types of plankton commonly perform this process? (2pt)

    3. What are the reactants and products of this process? (2pt)

ANSWER

1. What process supplies most of the usable energy in the ocean? (1pt)
   The process of photosynthesis

2. What types of plankton primarily perform this process? (2pt)
   Phytoplankton

3. What are the reactants and products of this process? (4pt)
   Reactants: CO_2, H_2O (carbon dioxide and water)
   Products: $C_6H_{12}O_6$, O_2 (carbohydrates and oxygen)

Note: The Team Challenge Question at the link below also relates to plankton: http://www.oceanleadership.org/files/CHEM.EASY_.pdf.